

THE WILLING SERVANTS

A history of electricity in the home
by Anthony Byers





Cover design contrasts modern labour saving electric home appliances with early models. Inside the cover are examples of promotional material produced by the Electrical Development Association between 1919 and 1939.

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Educational Service

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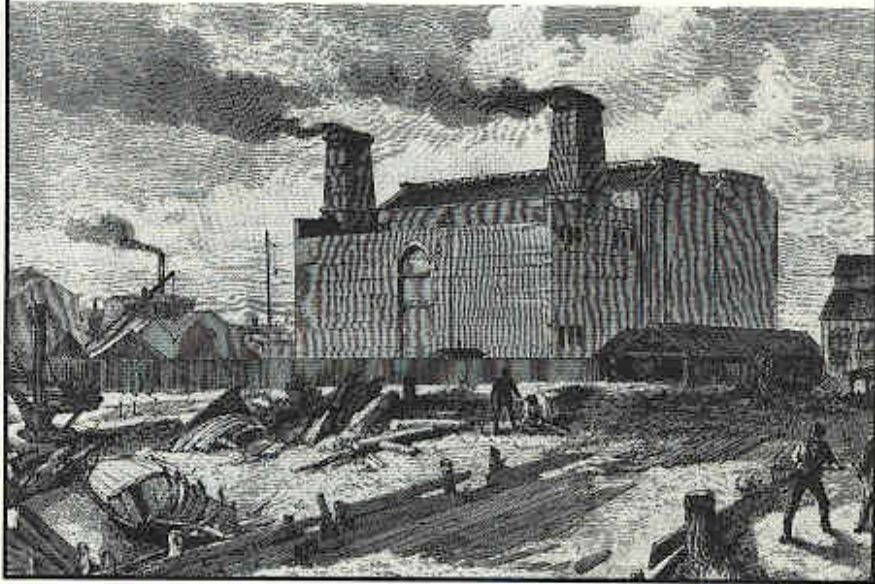
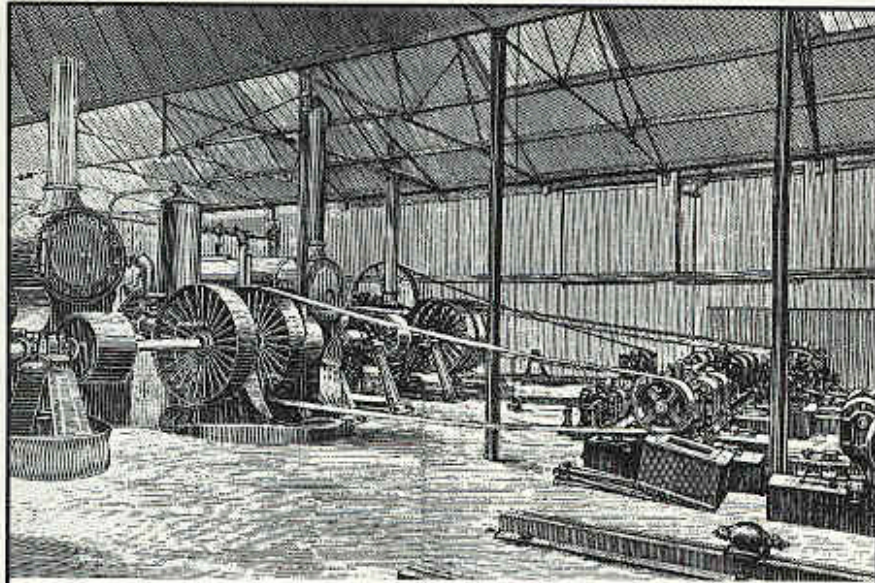
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The Willing Servants (*first published under the title Centenary of Service*) is produced by the Understanding Electricity educational information service sponsored by the electricity supply industries in the United Kingdom and the Republic of Ireland and by the United Kingdom Atomic Energy Authority. Its aim is to improve the knowledge of young people about basic electrical principles and their practical applications. Information is provided on the generation and transmission of electricity as well as background material on the use of electricity in commerce, agriculture, horticulture, industry and the home.

ONCE UPON A TIME



Previous page:
Among the first of the electricity generating stations were Brighton (1882) above, and Deptford (1889) below.

Opposite page:
Street lighting in Godalming and a sketch of the water mill from *The Graphic*, November 12, 1881.

When the townspeople of Godalming saw their streets light up one September evening in 1881 they never guessed they were making history. The lamps were lit by electricity and the power came from a generator connected to a waterwheel – the first public supply of electricity from a generating station.

There was so little sense of history in the occasion that nobody knows for certain the exact date of the switch-on that gave a supply for lighting and for private customers. The Town Council of this small market town in Surrey, 37 miles from London, simply recorded on 1st October 1881 that the annual contract for electricity was costing £95, a saving of £15 a year compared with the cost of gas lighting!

In the hundred years since that switch was operated on the generator in the watermill on the River Wey, electricity has changed the civilised world. Without electricity the mechanisation of the home, with all the time and labour saving benefits, would not have occurred. Life today is totally dependent on it.

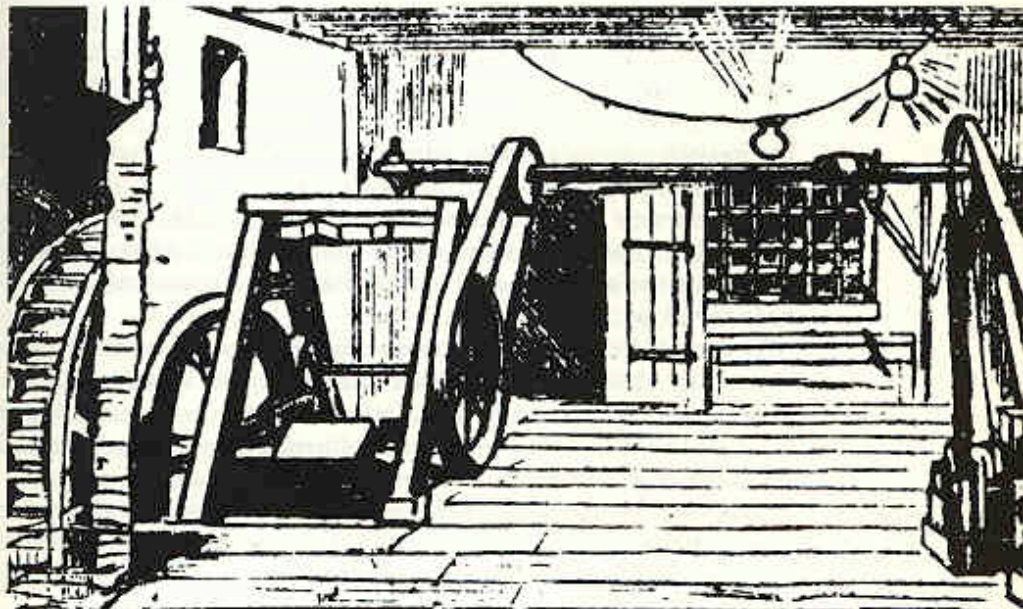
Think of the electrical appliances that would not exist if there were no electricity. Count the number of pieces of electrical equipment and lights you have in the home and do not be surprised if you soon reach one hundred. Even the telephone needs electricity and a great many toys and games work from electric batteries.

Electricity is a form of energy (the power to do work) that is produced from other forms of energy – such as mechanical rotation or chemical reaction. Its advantage over all other types of energy is its instant convenience. It is available at the flick of a switch and adaptable to a far wider range of uses than the other kinds of energy. It is very clean in use, there is no smell or smoke, and it is very easy to regulate electrical appliances automatically by thermostats, time switches and electronic controls such as those with the micro-chip.

At the touch of a switch, pure power is available through a socket on the wall from a power station many, many miles away. Instantly, it removes the muscular effort from all sorts of tasks like drilling a hole or mixing a cake. It will also provide good lighting; it will give more leisure and comfort and help to feed you. It will then entertain you with sound and vision right in your



THE TOWN OF GODALMING ILLUMINATED BY THE ELECTRIC LIGHT



living room. Electricity is man's most remarkable phenomenon and his most willing servant.

Beginning of electricity

Although the electricity supply industry is one hundred years old, the history of electricity is much older. Thousands of years before electricity's behaviour was accurately explained and its powers harnessed to man's use, magnetism was well known. The electro-magnetic properties of lodestone – a variety of iron oxide called magnetite – were so highly prized that if any sailor in the Middle Ages was caught tampering with a ship's lodestone, "he shall, if his life be spared, be punished by having the hand which he most uses, fastened by a dagger or knife thrust through it, to the mast or principal timber of the ship".

As magnetite seeks to line itself in a northerly direction everywhere on earth, the lodestone was used to magnetise the compass needles used by sailors to find their way across uncharted seas. Without it a ship would be virtually lost, able to navigate only by the sun and the stars.

Dr William Gilbert, physician to Queen Elizabeth 1 in 1600, carried out experiments on lodestone magnetism. He was the first to use the word electricity which he derived from the Greek word *elektron*, meaning amber. For when amber is rubbed vigorously it attracts small particles of dust – the effect we call static electricity.

For the next 150 years, 'electricity' attracted the curiosity of scientists. Some even suggested that it could be used to solve the most popular scientific problem of the age – a means of turning base metal into gold.

Then in 1746, Pieter van Musschenbroek, a professor at Leyden University, discovered by accident that electricity could be stored in what became known as the Leyden Jar. This was a water filled glass jar encircled by a metal band, electricity being stored in the glass between the metal and the water.

Musschenbroek also discovered the dangerous effect of 'electric shock'. An accidental electric shock prostrated him for two days and frightened him so much that he said he "would not take another for the Kingdom of France".

R. PAINTER, Jun. begs leave to inform the Gentlemen of **CAMBRIDGE**, and its environs, that he makes **ELECTRICAL MACHINES** upon the most approved principles; as likewise the following apparatus: **Electrical Batteries, Conductors, Luminous ditto, Quadrant Electrometers, Lame's ditto, Luminous Jars, Universal and Common Dischargers, Electropheruses, Thunder Houses, Electrical Cannons and Pistols, Electrical Bells, Flasks for the Aurora Borealis, Spiral Tubes, Jars and Bras Balls of different sizes, Insulated Stools, Medical Directors, Cylinders to any size, &c. &c.**

Portable Machines, in boxes, compleat, from 4l. 14s. 6d. to any price; some so low as 3l. 3s. With any of the following instruments to order: **Telescopes, reflecting, refracting, and achromatic; Mirrors, concave and convex; Portable Air Pumps, with all the various apparatus; Camera Obscuras; Microscopes, solar and compound; Pocket ditto; all kinds of Glasses for Telescopes; or any other Optical Instruments, to any size or focus; with many other articles in the above branches.**

The above will be sold at the London prices, and repaired on the most reasonable terms.

||+|| Orders from the country executed on the shortest notice.

Scientific curiosity encouraged experiment and invention. This advertisement appeared in *The Cambridge Chronicle*, November 23, 1786.

Electricity for cooking

Benjamin Franklin, in America in the following year also carried out an electrical experiment which very nearly killed him. He and his son never realised that they might get electrocuted when they sent up a kite during a thunderstorm. They were simply trying to prove that lightning is electrical in nature. An electric spark jumped from a metal key tied to the end of the string to charge a Leyden Jar and from this Franklin concluded that electricity consisted of "a kind of fluid". His curiosity aroused, he conducted further experiments and he was the first person to use electricity for cooking. After a picnic he wrote "I killed a turkey by the electric spark and roasted it by an electric jack before a fire kindled by the electric bottle".

Modern atomic theory has superseded Franklin's fluid theory of electricity. Today, the generation of an electrical charge by friction can be explained by the structure of atoms. But back in the eighteenth century all the experimenters knew was that electricity did not appear to do anything, or even exist, until it

had somewhere to go. They observed that it usually only wanted to find a path straight to earth. Today, we know that when you plug in or switch on electricity, you complete a circuit: the current passes through the electrical appliance, providing motive power, heat or light, and then – its work done – returns to the generator.

Opposite page:
The Electrical
Development
Association
produced
persuasive publicity
to encourage wider
use of electricity.

In 1821 Michael Faraday demonstrated that a wire connected to a battery would rotate around the fixed magnet and, in a similar fashion, it could be arranged so that the magnet would rotate around a wire. This conversion of electricity into mechanical work was the first electric motor. Ten years later in 1831 he demonstrated the reverse – that electricity could be induced into a conductor by a changing magnetic field.

It was to take another 50 years before Faraday's discoveries had been sufficiently developed to enable dynamo-electric generators to be built that were capable of supplying a public supply of electricity on a commercial basis. A further thirty years passed before generated electricity was available at a price that people could afford. Even in 1910 only about 2% of households were wired for electricity.

The first steam power station opened in London (Holborn) on 12th January 1882 and six weeks later Brighton power station provided the first permanent public supply of electricity.

Two other power stations opened later that year, at Hastings and Eastbourne, and cables were laid in the streets with the consent of the local authority. Almost at the same time Parliament passed the Electric Lighting Act which, among other regulations, gave the first statutory right for a person near to a power station to demand a supply of electricity for his factory or his home.

By 1914 there were enough power stations and a growing number of customers to make electricity relatively cheap although, until the National Grid was established in 1926, there were big differences in the prices charged between the different companies.

In 1919 the British Electrical Development Association (soon simply known as EDA) was formed to promote the wide use of electricity. It used all the popular means – including poetry – to promote the sales of electrical appliances and lighting on behalf of the growing number of electrical companies and supply

The Rubaiyat of the Electric House.



Awake: The Time-switch by the warm Bed's Side
Has boiled your Kettle ere the Cock has Cried:
And Lo: The Tea is ready, fill the Cup,
And chuckle as the Rain pours down outside.

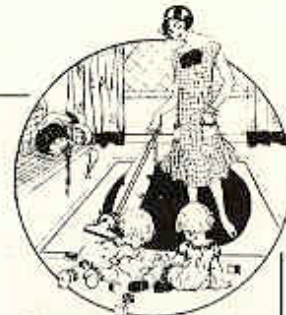
Come, press the Switch, and as the radiant Glow
Foretells the Sparkling Water's warming Flow,
Pity those Neighbours who, 'fore Sticks and Coal,
Kneel on their Hearths and wheezing Bellows Blow.

I always think that nothing tastes so sweet
As juicy, cooked-electrically Meat,
That every Meal prepared in selfsame way
Incites each jaded Mortal more to eat.

Ah, make the most of where ye have to stay
As too brief Sojourners in Life's short Way,
While in that Chamber where your Guests repose
Lie those who bless your Name from Dusk to Day:

Ah, use the Juice :-and let the Mains provide
Such Warmth as never with Cold Ashes died,
And to the Scrap Heap of Oblivion fling
The Greedy Range with blackened Jaws set wide.

For, since my House has been Electrified,
Dirt and Discomfort have for ever died,
And with them past Regrets and future Fears,
While Light hath taken Beauty for his Bride.



*Spring Cleanliness
Every Day*



COOK
with an
ELECTRIC COOKER



undertakings.

By 1925 the national average price of electricity had come down – especially for use other than lighting – and Victor Dale, the Manager of EDA, was writing in the Financial Times: “Conversion to electric methods in established populous areas will assist more than anything else to mitigate the smoke evil and progressively reduce the air-polluting emissions from domestic chimneys. Longer hours of “better sunshine” will be one only of the first results accruing from more or less complete domestic electrification in this country – the contention will not be lost on those who recollect the cleanness of the atmosphere in the Metropolis during the protracted miners’ strike of 1923.”

Cleaner air, convenience, time and labour saving and its ability to perform tasks beyond the powers of any other form of energy, these were the benefits that impressed the public and by 1939 almost three quarters of the homes in the United Kingdom had electricity laid on.

With the celebration of the centenary, the United Kingdom can boast the largest electricity supply organisation in the world. It continues to be an innovator in forms of generation such as nuclear power and pumped storage; in transmission, like the unified grid system which reduces the risk of prolonged breakdown by switching power from one area to another.

The Electricity Boards, as well as assuring a reliable supply, also operate a nationwide chain of retail shops that offer free advice as well as appliances tested for safety, and control a service organisation that – for electricity supply – is there, seven days a week and twenty-four hours a day.

In 1881 the Godalming generating station employed about five people; in 1947, when the electricity supply industry came under public ownership, there were 147,000 employees and eleven million customers in England and Wales. Today, the number of employees is almost 160,000 and there are more than twenty million customers supplied from 127 generating stations – coal, oil, water, gas and nuclear power.